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NIAGARA AIR QUALITY SURVEY REPORT - 1987

(Occidental Chemical Corporation Niagara Falls, New York, USA)

NON-AQUEOUS PHASE LIQUID (NAPL) INCINERATION TEST

OCTOBER 1987

ARB-166-87-AR/SP

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Ministry
of the
Environment
Ontario

E. PICHÉ, Director
Air Resources Branch

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(Occidental Chemical Corporation
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Non-Aqueous Phase Liquid (NAPL) Incineration Test

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ARB - 166 - 87 - AR/SP

Prepared for:

The Minister's Office
and the
Niagara River Improvement Programme
Intergovernmental Relations and Strategic Projects Division
Ministry of the Environment

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EXECUTIVE SUMMARY

At the request of the Minister's Office and the Ministry's Niagara River Improvement Programme, Mobile Air Monitoring Units #2 and #3 (the TAGA 3000) of the Air Resources Branch conducted an ambient air quality survey in the Niagara Falls area of Ontario from October 8 to 12, 1987. As with a previous survey conducted in November of 1986 (ARB-048-87-AQM), the objectives were to provide on-site real-time screening of the ambient air for selected polychlorinated biphenyl congeners and other chlorinated organics at times when Occidental Chemical Corporation was conducting tests at its liquid hazardous waste incineration facility in Niagara Falls, New York, USA.

During the incineration tests, the winds were such that the gaseous emissions from the Occidental liquid hazardous waste incineration facility were carried into the United States. Since the monitoring units were restricted to the Canadian side of the Niagara River, only upwind air quality parameters could be measured.

From the acquired air quality data, none of the selected polychlorinated biphenyl congeners nor any of the other 36 chlorinated organics were detected. All concentration measurements were very low and the air quality was found to be very similar to that reported during the November 1986 survey. None of the applicable Ministry of the Environment Air Quality Criteria or Guidelines were exceeded and in general, the results were indicative of a relatively clean urban environment.

SOMMAIRE

À la demande du bureau du ministre et du programme d'amélioration du Niagara relevant du Ministère, les unités mobiles de surveillance de l'air n^{o} 2 et n^{o} 3 (analyseur des gaz atmosphériques à l'état de trace - Modèle 3000) de la Direction des ressources atmosphériques ont procédé à une étude de la qualité de l'air ambiant dans la région de Niagara Falls, en Ontario, du 8 au 12 octobre 1987. Tout comme lors d'une étude précédente, effectuée en novembre 1986 (ARB-048-87-AQM), il s'agissait de dépister sur place, en temps réel, dans l'air ambiant, certaines substances assimilables aux biphényles polychlorés et d'autres substances organiques chlorées, lorsque la société Occidental Chemical Corporation effectuait des essais à son usine d'incinération des déchets liquides dangereux de Niagara Falls (État de New York) aux États-Unis.

Lors de ces essais d'incinération, les vents poussaient les gaz libérés par l'usine vers les États-Unis. Les unités de surveillance n'étant installées que sur la rive canadienne du Niagara, seuls les paramètres de qualité de l'air dans le vent par rapport à l'usine ont pu être mesurés.

D'après les données recueillies, on n'a détecté aucun des produits assimilables aux biphényles polychlorés ni des 36 autres substances organiques chlorées. Toutes les mesures de concentration étaient très faibles et la qualité de l'air s'est avérée très similaire à ce qu'avait révélé l'étude de novembre 1986. En aucun cas les critères ou lignes directrices sur la qualité de l'air ambiant du ministère de l'Environnement n'ont été dépassés et, en général, les résultats indiquaient un environnement urbain relativement pur.

1.0 INTRODUCTION

Occidental Chemical Corporation of Niagara Falls, New York, made a submission to the New York State Department of Environmental Conservation for the destruction of NAPL (non-aqueous phase liquid) landfill waste from Hyde Park in Niagara Falls, New York. In this submission, a 3-phase test burn programme was proposed. For the first phase, the liquid hazardous waste incineration facility of Occidental Chemical Corporation was tested to demonstrate destruction efficiency and compliance with US Federal and State Regulations for the disposal of regular in-house plant wastes. This programme was carried out from October 16 to 21, 1986 and the results were reviewed by the US EPA (United States Environmental Protection Agency), the Ontario MOE (Ministry of the Environment) and other agencies. Permission was then given for the second phase which dealt solely with the destruction efficiency of PCBs (polychlorinated biphenyls). PCB oil from Occidental's plant in Taft, Louisiana was blended with transformer oil from Niagara Mohawk and this feed was used for the second phase incineration test. The second phase was conducted from November 5 to 10, 1986 and during this time, MAMUs #1 and #3 (Mobile Air Monitoring Units #1 and #3) of the ARB (Air Resources Branch) conducted an air quality survey on the Canadian side of the Niagara River with objectives of providing near real-time on-site screening of the ambient air for selected PCBs and other chlorinated organics. No PCBs were detected and the results of this survey were presented in MOE report ARB-048-87-AQM. The results of this second phase met the USA EPA Criteria and were presented at a Public Hearing in Niagara Falls, New York. The third phase, the incineration of NAPL from Hyde Park, was allowed to proceed. Prior to incineration, analyses of the NAPL waste revealed concentrations of approximately 10 ppm (parts per million) of dioxins/furans and approximately 10 ppm of PCBs. In addition, this waste was spiked with 1,1,1-trichloroethane in order to demonstrate destruction efficiency. The third phase incineration tests were carried out from October 8 to 12, 1987.

At the request of the Minister's Office and the Niagara River Improvement Programme, MAMUs #2 and #3 of the Air Resources Branch conducted an ambient air quality survey in the Niagara Falls area of Ontario. This survey lasted from October 8 to 12, 1987 and the objectives were to provide on-site real-time screening of the ambient air for selected polychlorinated biphenyl congeners and other chlorinated organics at times when Occidental Chemical Corporation was conducting incineration tests in Niagara Falls, New York, USA.

MAMU #3 contains the TAGA 3000 system which was set up solely to measure ambient concentrations of PCBs. Briefly, the TAGA (Trace Atmospheric Gas Analyzer) 3000 is a specialized single quadrupole mass spectrometer fitted with an APCI (Atmospheric Pressure Chemical Ionization) source. When monitoring PCBs, the ion source is directly coupled to a computer controlled preconcentrator and thermal desorption device called an ASTA (Automated Short Term Adsorber). The TAGA/APCI/ASTA technique provides PCB concentration measurements based on 2-minute ambient air samples. A half-hour average concentration of PCB was then computed by averaging the concentrations from 15 consecutive 2-minute samples. In this study, the selected PCB congeners were the di-, tri-, tetra- and penta-chlorobiphenyls. The PCB detection limits (DLs) were typically 0.01 ug/m^3 per congener or 0.04 ug/m^3 for the total di- to penta-chlorobiphenyls. A more detailed description of this methodology is contained in report ARB-048-87-AQM.

The instrumentation of MAMU #2 can simultaneously measure a wide variety of gaseous contaminants that could be in the ambient air. This is possible through the use of dedicated analyzers (Table 1) that continuously measure concentrations of up to 11 different common contaminants at the sub ppm (parts per million) level and a high resolution gas chromatographic (GC) system that has the capability of identifying and quantitating up to 138 different organic compounds in the range of 1 to 10 ug/m^3 (Table 2). For this survey, the common contaminants of interest were Total Hydrocarbon Compounds (THC), Carbon Monoxide (CO) and Nitrogen Dioxide (NO_2) and the organics of interest were the 36 chlorinated compounds with special attention given to 1,1,1-trichloroethane.

The Occidental Chemical Corporation is situated in the chemical valley east of Niagara Falls, New York, and along the north shore of the Niagara River (Figure 1). The nearest Canadian territory is the south shore of the Niagara River, approximately 3 km SSW of this facility. Both monitoring units were stationed in this area and on-site wind direction and speed were closely monitored. If the winds were from the NNE to ENE quadrant, gaseous emissions from Occidental's liquid hazardous waste incineration facility would impinge on this nearby Canadian territory. To supplement the on-site recordings, meteorological information (weather forecasts and surface analysis (Table 3)) from the Buffalo weather office was also utilized during this survey.

2.0 DISCUSSION OF RESULTS

2.1 General

Both monitoring units arrived in Niagara Falls, Ontario on October 7, 1987 and were immediately placed on stand-by at the Second Intake for Ontario Hydro on the Canadian side of the Niagara River, approximately 3 km southwest of Occidental Chemical Corporation of Niagara Falls, New York (Figure 1). This was the same monitoring location used during November of 1986 and visual observation of stack emissions from Occidental's incineration facility was possible from this site.

On October 7, complete calibrations were performed on all analyzers housed in these monitoring units.

Mr. Gary Wong, a source assessment engineer from the Emission Technology and Regulation Development Section of the Air Resources Branch, was the Ministry's on-site observer at Occidental. The monitoring staff was informed that the third phase would commence on October 8 and would be comprised of 3 separate tests. In reality, the programme did commence as scheduled but there were 4 tests finally ending at 16:00 hrs local time on October 12, 1987.

2.2 Thursday, October 8

A north-south orientated high pressure ridge located over Lake Superior was forecast to move to lie near Montreal by early Friday. Initially, light rain was reported in the Niagara region on October 8. By noon, it was partially sunny however, it still remained cool with the ambient temperature approaching 10 °C (Celsius). As noted in Table 3, moderate northwesterly winds at 14 kts (knots) were reported at Buffalo, New York. During the morning, surface winds from the northwest at 18 km/hr were recorded by the MAMUs and as the day evolved, the winds backed and decreased to become westnorthwesterly at 10 km/hr after 16:30 hrs.

Because of the prevailing winds, the Canadian side of the Niagara River was **upwind** of the Occidental Chemical Corporation liquid hazardous waste incineration facility in Niagara Falls, New York State.

As reported by Mr. Wong, conditioning and pretesting of the incinerator was performed during the morning. The NAPL feed was introduced to the incinerator at 16:00 hrs. At 16:35 hrs, in-stack testing commenced. At 21:00 hrs, the testing was completed and the NAPL feed was halted (Table 4).

Although the monitoring site was upwind, screening of the ambient air and determining air quality parameters on the Canadian side of the Niagara River was deemed necessary for future comparisons if the emissions from Occidental were to impinge on Canadian territory. MAMU #2 started acquiring ground level concentration (GLC) data for the common contaminants at 10:00 hrs. (This monitoring continued throughout the day and lasted until survey end on Monday, October 12. A concentration/time graph for these data is presented in Figure 2 in the appendix.) Meanwhile, two calibrations were run on the TAGA 3000 system in order to determine the daily detection limits (DLs) for PCBs. The results of these two calibrations were 40 and 30 ng/m^3 (nanograms per cubic metre) for an average of 35 ng/m^3 for the di- to penta-chlorobiphenyls. Starting at 10:11 hrs, a one-hour VOC (Volatile Organic Compound) sample was taken and then immediately analyzed by the GC system. Another VOC sample was acquired at 12:58 hrs. Between 16:23 and 21:00 hrs (the times of the actual NAPL feed incineration), 2 more one-hour VOC samples and 8 half-hour PCB samples were acquired. From all of these air quality data (Tables 5 and 6), **no PCBs or any other chlorinated organics were detected** (refer to Table 2 for the DLs of the chlorinated organics). For the other organics, a maximum of only 15 different compounds were identified and the total organic concentrations ranged from 18 to 35 ug/m^3 (for an average of 24 ug/m^3) with the alkanes and aromatics comprising 57 and 43% of these totals respectively (Table 5). The respective maximum one-hour average GLCs for common contaminants CO, THC and NO$_2$ were 0.4, 1.2 and 0.02 ppm (Table 6).

2.3 Friday, October 9

A low pressure area centered over Lake Superior was forecast to move eastward to lie over central Quebec by early Saturday. Because of this system, the air mass in southern Ontario was moist and unstable resulting in overcast and scattered shower conditions throughout the day. The ambient daytime temperature was usually in the low teens. During the morning, the winds were from the south at 10 kts (Table 3) but as the cold front associated with this low pressure area approached, the winds veered to become by mid-afternoon, southwesterly at 15 kts. Between 10:30 and 16:00 hrs, the on-site winds were southerly at 8 km/hr (Table 6).

The Canadian side of the Niagara River was **upwind** of the Occidental facility in Niagara Falls, New York.

Mr. Al Meadows, a senior technologist in the Source Monitoring Section of the Pollution Measurement Division of Environment Canada, was the on-site observer for this day. At the incinerator, the NAPL feed commenced at 10:30 hrs. The stack sampling/testing commenced at 10:50 hrs and ended at 15:55 hrs. The NAPL feed was halted at 16:00 hrs.

Apart from the continuous measurements of the common contaminants, one VOC sample was acquired and analyzed by the GC system of MAMU #2; one PCB calibration was run on the TAGA 3000 system of MAMU #3; and four half-hour samples for PCB detection were accrued (Tables 4 and 5). Once again, no PCBs (a detection limit of 29 ng/m^3 being determined from the calibration) or other chlorinated organics were detected in the acquired samples (Table 6). Fourteen different organics were detected in the VOC sample and the total organic concentration was only 26 ug/m^3 (Table 5). Low concentrations were also determined for the common contaminants as the maximum one-hour average GLCs for CO, THC and NO_2 were 0.4, 1.4 and 0.02 ppm respectively (Table 6).

2.4 Saturday, October 10

The aforementioned cold front moved through Niagara Falls just after midnight. The winds continued to veer and by mid-morning, they were northnorthwesterly at 10 kts (Table 3). The air mass was moist and stable during the morning giving way to sunny periods by early afternoon with daytime temperatures approaching 10°C. Between 10:00 and 15:00 hrs, northerly winds at 16 km/hr were recorded on-site (Table 6).

The Canadian side of the Niagara River was upwind of the Occidental facility in Niagara Falls, New York.

According to Mr. Al Meadows, incineration of the NAPL waste commenced at 10:05 hrs. The stack sampling/testing was carried out from 10:25 to 15:10 hrs and the NAPL feed was halted at 15:20 hrs (Table 4).

Two PCB calibrations were performed on the TAGA 3000 mass spectrometer system and from this, the daily PCB detection limit was determined to be 38 ng/m^3. Between 10:00 and 15:00 hrs, 3 half-hour samples were accrued with no PCBs being detected (Table 6). No VOC sampling programme was carried out; however, monitoring of the common contaminants continued. Between 10:05 and 15:05 hrs, low GLCs were determined for these contaminants as the respective maximum one-hour average GLCs of CO, THC and NO_2 were only 0.4, 1.7 and 0.02 ppm (Table 6).

2.5 Monday, October 12

A northeast-southwest orientated high pressure ridge over Lake Superior dictated the weather in southern Ontario on this date. The air mass was dry and stable and the ambient daytime temperature approached 10°C. The sky condition was scattered to broken cumulus and the winds were light westerly. Between 09:35 and 15:35 hrs, westerly winds at 3km/hr were monitored by the MAMUs (Table 6).

This was the last day of testing at the Occidental liquid hazardous waste incinerator in Niagara Falls, New York and because of the wind, the Canadian side of the Niagara River was still upwind of this facility.

The on-site observer was Mr. Paul Gorman, the principal chemical engineer with Midwest Research Institute of Kansas City. The NAPL waste feed started at 09:30 hrs and after some delay, the testing commenced at 11:55 hrs. The testing continued until 16:07 hrs and the NAPL waste feed was halted at 16:10 hrs (Table 4).

Two PCB calibrations were performed and the daily detection limit for PCBs was determined to be 36 ng/m^3. Between 09:30 and 16:10 hrs, the TAGA 3000 system screened the ambient air for PCBs. Four half-hour ambient air samples were accrued but no PCBs were detected (Table 6). Low concentrations were also measured for the common contaminants during this period. The respective maximum one-hour average GLCs of CO, THC and NO_2 were 0.4, 1.4 ppm and ND (not detected or less than 0.01 ppm) (Table 6). One one-hour VOC sample was acquired at 11:20 hrs and the GC analyses of this sample again revealed very low concentrations (Table 5). Thirteen different organics (no chlorinated species) were detected and the total organic concentration was only 24 ug/m^3.

4.0 SUMMARY

At the request of the Minister's Office and the Niagara River Improvement Programme, Mobile Air Monitoring Units #2 and #3 (TAGA 3000) of the Air Resources Branch conducted an ambient air quality survey in the Niagara Falls area of Ontario from October 8 to 12, 1987. As with a previous survey conducted in November of 1986 (ARB-048-87-AQM), the objectives were to provide on-site real-time screening of the ambient air for selected polychlorinated biphenyl congeners and other chlorinated organics at times when Occidental Chemical Corporation was conducting incineration tests of NAPL waste in Niagara Falls, New York, USA.

During the incineration tests, the winds were such that the gaseous emissions from the Occidental liquid hazardous waste incineration facility were carried into the United States. The winds ranged from the southwest to north during these periods and the monitoring units, restricted to the Canadian side of the Niagara River, could only determine upwind air quality parameters.

During the four days of monitoring, 19 half-hour ambient air samples were accrued for PCB analysis and 6 one-hour ambient air samples were analyzed for organic content. None of the selected PCB congeners nor any of the 36 different chlorinated organics (especially 1,1,1-trichloroethane) were detected in any of these samples. That is, if these compounds existed in the ambient air, they were at concentrations less than the detectable limits as determined by the individual analyzers. For the selected PCB congeners, the detection limits ranged from 29 to 38 ng/m^3 (as determined daily by the TAGA 3000 mass spectrometer system) and for the other chlorinated organics, the detection limits were in the range of 0.3 to 5 ug/m^3 (as determined by the GC system).

Low concentrations were also determined for the other ambient air quality data. From the 6 one-hour samples analyzed by the GC for organic content, an average of 14 different organics were detected and the average total organic concentration was only 25 ug/m^3. For the common contaminants, approximately 100 hours of continuous measurements were acquired. During the incineration tests, the maximum one-hour average concentration of carbon monoxide was only 0.4 ppm; for total hydrocarbon compounds, 1.4 ppm; and for nitrogen dioxide, 0.02 ppm.

In conclusion, the air quality data were very similar to those reported during the November 1986 survey. None of the applicable Ministry of the Environment Air Quality Criteria or Guidelines were exceeded and in general, the results were indicative of a relatively clean urban environment.

APPENDIX: The Data

Figure 1

General Survey Area for the 1987 Niagara Survey

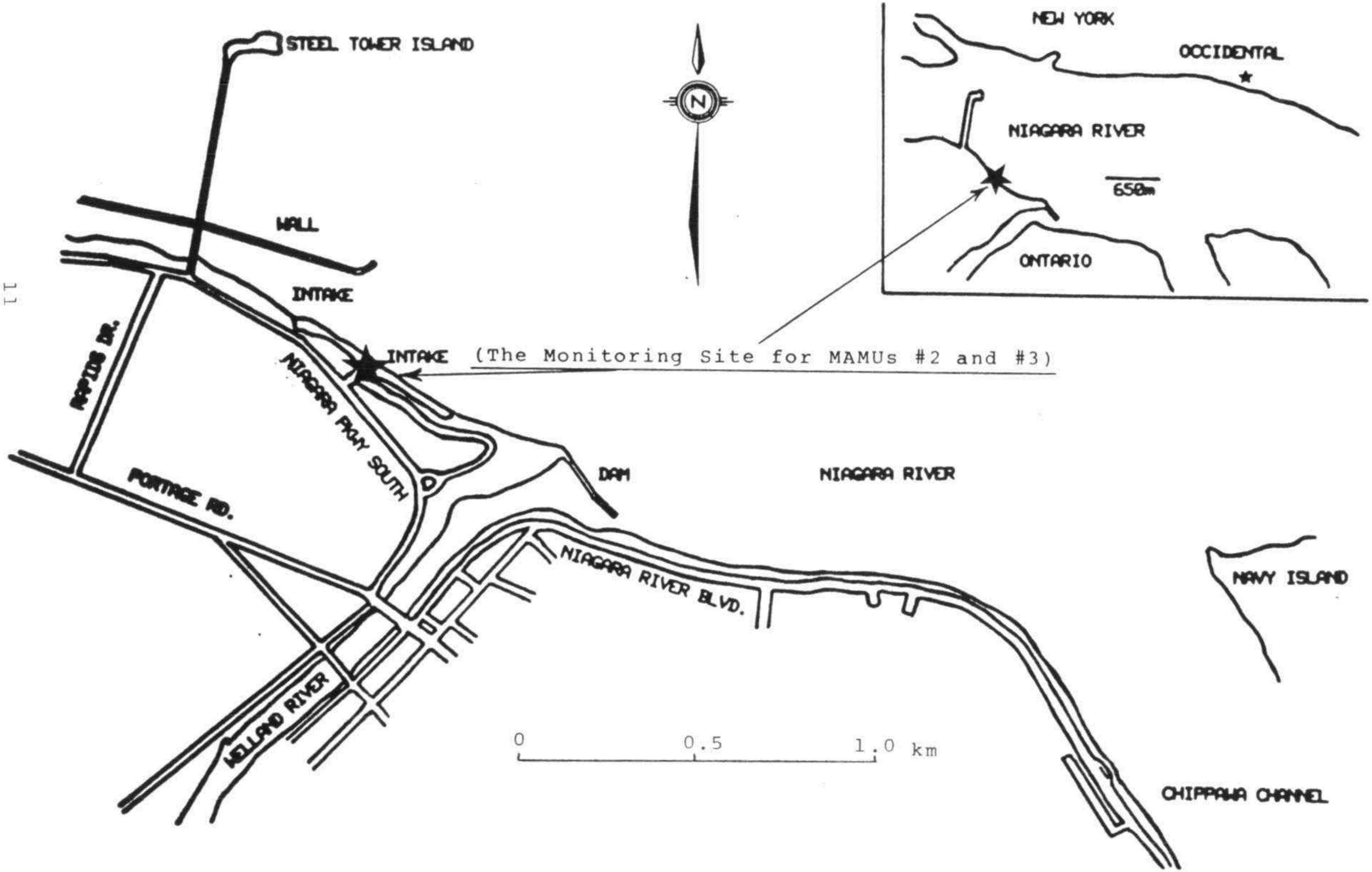

Table 1

THE INSTRUMENTATION OF MOBILE AIR MONITORING UNIT #2

Instrument	Manufacturer	Analytical Technique	Full Scale Sensitivity
THC, CH4, TH-M analyzer	Ingenieur-Produktions-Gruppe Munchen (IPM) RS-t	Dual flame ionization	50 ppm THC (as CH4)
H2S, SO2, NOx sources	Hartmann & Braun Prufgasgenerator	N/A	N/A
TRS analyzer	Monitor Labs 8850 c/w ML 8770	Fluorescence	0.5 ppm H2S
SO2 analyzer	Monitor Labs 8850	Fluorescence	0.5 ppm SO2
NOx, NO2, NO analyzer	Monitor Labs 8840	Chemi-Luminescence	1.0 ppm NOx (as NO2)
CO analyzer	Thermo Electron P48	Gas Filter Correlation	100 ppm CO (digital)
O3 analyzer/ source	Dasibi 1003-AAS	UV Absorption	1.0 ppm O3 (digital)
Hg analyzer	Scintrex HGP-2	UV Absorption	50 ug/m3
Hewlett Packard Data Acquisition System - HP 85 and HP 3497A			
Gas Chromatograph	HP 5880 Dual Capillary Column c/w HP 86 Data Acquisition System	Flame Ionization Det.	as set per calibrations

Meteorological Instrumentation

Instrument	Manufacturer	Scale
** Wind speed	Lambrecht GmBH	km/hr
** Wind direction	Lambrecht GmBH	degrees
Temperature	Weather Measure (WM) T621	degrees Celsius
Humidity	WM-HM-11P	absolute & %
Barometric pressure	WM-BM70-B242	millibars
Solar Radiation	WM Star Pyranometer	milliwatts/cm2

** These instruments are located on top of a 10 metre retractable tower

Table 2

Characteristics of the Organics Measured by the Gas Chromatographic Systems of MAMU #2

All concentrations are in terms of ug/m^3 (micrograms per cubic metre) Updated October 16, 1987

		Detection Limits	Standards, Guidelines or Provisional Guidelines	Criterion	TWA	STEL	Alternate Names
1	PROPANE	0.2					
2	PROPADIENE	0.3					ALLENE
3	PROPYNE	0.3					METHYL ACETYLENE
4	CYCLOPROPANE	0.3					
5	2-METHYLPROPANE	0.3					ISOBUTANE
6	CHLOROETHENE	0.3	560 (2)	280 (A)	5000	10000	VINYL CHLORIDE; CHLOROETHYLENE
7	1-BUTENE	0.3					
8	1,3-BUTADIENE	0.3					
9	BUTANE	0.2			1900000		*n-BUTANE*
10	1-BUTYNE	0.3					ETHYLACETYLENE
11	CHLOROETHANE	0.3			2600000	3250000	ETHYL CHLORIDE
12	3-METHYL-1-BUTENE	0.3					ISOAMYLENE
13	2-METHYLBUTANE	0.3					ISOPENTANE
14	2-METHYL-1-BUTENE	0.3					
15	PENTANE	0.2			1800000	2250000	*N-PENTANE*
16	2-METHYL-1,3-BUTADIENE	0.4					ISOPRENE
17	trans-2-PENTENE	0.2					
18	cis-2-PENTENE	0.2					
19	DICHLOROMETHANE	1.5	100000 (1)	100000 (B)	350000	1740000	METHYLENE CHLORIDE
20	2-METHYL-2-BUTENE	0.3					
21	2,2-DIMETHYLBUTANE	0.2					NEOHEXANE

Table 2 ctd.

Characteristics of the Organics Measured by the Gas Chromatographic Systems of MAMU #2

All concentrations are in terms of ug/m^3 (micrograms per cubic metre) Updated October 16, 1987

	Detection Limits	Standards, Guidelines or Provisional Guidelines	Criterion	TWA	STEL	Alternate Names
22 trans-1,2-DICHLOROETHENE	0.3					
23 3-METHYL-1-PENTENE	0.2					
24 4-METHYL-1-PENTENE	0.2					
25 CYCLOPENTANE	0.2					
26 2,3-DIMETHYLBUTANE	0.2					
27 2-METHYLPENTANE	0.2					
28 3-METHYLPENTANE	0.2					
29 1-HEXENE	0.3					
30 cis-1,2-DICHLOROETHENE	0.3			790000	1000000	cis-1,2-DICHLOROETHYLENE; SYM-DICHLOROETHYLENE
31 2-CHLOROBUTANE	0.6					sec-BUTYL CHLORIDE
32 1-CHLORO-2-METHYLPROPANE	0.4					
33 HEXANE	0.3	35000 (2)	12000 (A)	180000		*n-HEXANE*
34 TRICHLOROMETHANE	2.2	1500 (2)	500 (A)	50000	225000	CHLOROFORM
35 trans-3-HEXENE	0.3					
36 3-CHLORO-2-METHYLPROPENE	0.3					ISOBUTENYL CHLORIDE
37 METHYLCYCLOPENTANE	0.2					
38 2,4-DIMETHYLPENTANE	0.2					
39 1,2-DICHLOROETHANE	0.2			40000	60000	ETHYLENE CHLORIDE
40 2,2-DIMETHYLPENTANE	0.4					
41 2,2,3-TRIMETHYLBUTANE	0.2					
42 1,1,1-TRICHLOROETHANE	1.0	350000 (1)	115000 (A)	19000000	2450000	METHYL CHLOROFORM

Table 2 ctd.

Characteristics of the Organics Measured by the Gas Chromatographic Systems of MAMU #2

All concentrations are in terms of ug/m³ (micrograms per cubic metre)   Updated October 16, 1987

	Detection Limits	Standards, Guidelines or Provisional Guidelines	Criterion	TWA	STEL	Alternate Names
43 1-CHLOROBUTANE	0.4					n-BUTYL CHLORIDE
44 BENZENE	0.2	10000 (1)	3300 (A)	30000	75000	
45 TETRACHLOROMETHANE	0.9	1800 (2)	600 (A)	20000	125000	CARBON TETRACHLORIDE
46 3,3-DIMETHYLPENTANE	0.2					
47 CYCLOHEXANE	0.2	300000 (2)	100000 (A)	1050000	1300000	HEXAHYDROBENZENE
48 2,3-DIMETHYLPENTANE	0.3					
49 2-METHYLHEXANE	0.5					ISOHEPTANE
50 CYCLOHEXENE	0.3			1015000		
51 DIBROMOMETHANE	18.4					METHYLENE DIBROMIDE; METHYLENE BROMIDE
52 1,2-DICHLOROPROPANE	0.6					PROPYLENE CHLORIDE
53 3-METHYLHEXANE	0.5					
54 2,3-DICHLOROPROPENE	0.7			5000	50000	2,3-DICHLOROPROPYLENE
55 TRICHLOROETHENE	0.3	85000 (1)	28000 (A)	270000	1080000	TRICHLOROETHYLENE
56 2,2,4-TRIMETHYLPENTANE	0.2					ISOOCTANE
57 1-HEPTENE	0.3					
58 HEPTANE	0.2			1600000	2000000	*n-HEPTANE*
59 trans-2-HEPTENE	0.3					
60 METHYLCYCLOHEXANE	0.2			1600000	2000000	HEXAHYDROTOLUENE
61 2,2-DIMETHYLHEXANE	0.2					
62 ETHYLCYCLOPENTANE	0.2					
63 4-METHYLCYCLOHEXENE	0.3					

Table 2 ctd.

Characteristics of the Organics Measured by the Gas Chromatographic Systems of MAMU #2

All concentrations are in terms of ug/m³ (micrograms per cubic metre) Updated October 16, 1987

	Detection Limits	Standards, Guidelines or Provisional Guidelines	Criterion	TWA	STEL	Alternate Names
64 2,5-DIMETHYLHEXANE	0.5					
65 1-CHLOROPENTANE	0.4					n-AMYL CHLORIDE; PENTYL CHLORIDE
66 1,1,2-TRICHLOROETHANE	1.1					VINYL TRICHLORIDE
67 2,3,4-TRIMETHYLPENTANE	0.2					
68 TOLUENE	0.2	2000 (1)	2000 (A)	375000	560000	*METHYLBENZENE*; PHENYLMETHANE
69 1,3-DICHLOROPROPANE	0.7			350000	510000	TRIMETHYLENE CHLORIDE
70 2-METHYLHEPTANE	0.2					
71 4-METHYLHEPTANE	0.2					
72 c-1,3-DIMETHYLCYCLOHEXANE	0.2					
73 3-METHYLHEPTANE	0.2					
74 1,2-DIBROMOETHANE	2.1					ETHYLENE DIBROMIDE; ETHYLENE BROMIDE
75 1,1-DIMETHYLCYCLOHEXANE	0.3					
76 1-OCTENE	0.4	150000 (3)	50000 (A)			
77 trans12DIMETHYLCYCLOHEXANE	0.3					*trans-1,2-DIMETHYLCYCLOHEXANE
78 trans-4-OCTENE	0.3					
79 TETRACHLOROETHENE	0.9	10000 (2)	4000 (A)	335000	1340000	TETRACHLOROETHYLENE; PERCHLOROETHYLENE
80 c-1,4-DIMETHYLCYCLOHEXANE	0.3					
81 OCTANE	0.3	45400 (3)	15300 (A)	1450000	1800000	*n-OCTANE*
82 trans-2-OCTENE	0.6					
83 cis12DIMETHYLCYCLOHEXANE	0.2					
84 CHLOROBENZENE	0.4			350000		PHENYL CHLORIDE

Table 2 ctd.

Characteristics of the Organics Measured by the Gas Chromatographic Systems of MAMU #2

All concentrations are in terms of ug/m³ (micrograms per cubic metre)　　Updated October 16, 1987

	Detection Limits	Standards, Guidelines or Provisional Guidelines	Criterion	TWA	STEL	Alternate Names
85 ETHYLCYCLOHEXANE	0.1					
86 1-CHLOROHEXANE	0.5					n-HEXYL CHLORIDE
87 ETHYLBENZENE	0.3	4000 (1)	4000 (B)	435000	545000	
88 m&p-XYLENES	0.3	2300 (4)	2300 (A)	435000	655000	*1,3-DIMETHYLBENZENE*
89 4-METHYLOCTANE	0.3					
90 2-METHYLOCTANE	0.3					
91 3-METHYLOCTANE	0.3					
92 STYRENE	0.5	400 (1)	400 (A)	215000	425000	*ETHENYLBENZENE*; PHENYLETHYLENE; VINYLBENZENE
93 1,4-DICHLOROBUTANE	0.3					
94 o-XYLENE	0.3	2300 (4)	2300 (A)	435000	655000	*1,2-DIMETHYLBENZENE*
95 1,1,2,2-TETRACHLOROETHANE	2.6					ACETYLENE TETRACHLORIDE
96 1,2,3-TRICHLOROPROPANE	1.3			300000	450000	TRICHLOROHYDRIN
97 1-NONENE	0.7					
98 trans-1,4-DICL-2-BUTENE	0.9					
99 NONANE	0.3			1050000	1300000	*n-NONANE*
100 ISOPROPYLBENZENE	0.3	100 (3)	100 (B)			*(1-METHYLETHYL)BENZENE*; CUMENE
101 2-CHLOROTOLUENE	0.3					*2-CHLORO-1-METHYLBENZENE*; o-TOLYL CHLORIDE; o-CHLOROTOLUENE
102 3-CHLOROTOLUENE	0.5					*3-CHLORO-1-METHYLBENZENE*; m-TOLYL CHLORIDE; m-CHLOROTOLUENE
103 4-CHLOROTOLUENE	0.5					*4-CHLORO-1-METHYLBENZENE; p-TOLYL CHLORIDE; p-CHLOROTOLUENE
104 PROPYLBENZENE	0.4					n-PROPYLBENZENE
105 3-ETHYLTOLUENE	0.3					*1-ETHYL-3-METHYLBENZENE*; M-ETHYLTOLUENE

Table 2 ctd.

Characteristics of the Organics Measured by the Gas Chromatographic Systems of MAMU #2

All concentrations are in terms of ug/m³ (micrograms per cubic metre) Updated October 16, 1987

	Detection Limits	Standards, Guidelines or Provisional Guidelines	Criterion	TWA	STEL	Alternate Names
106 4-ETHYLTOLUENE	0.3					*1-ETHYL-4-METHYLBENZENE*; P-ETHYLTOLUENE
107 1,3,5-TRIMETHYLBENZENE	0.4			125000	170000	MESITYLENE
108 2-ETHYLTOLUENE	0.3					*1-ETHYL-2-METHYLBENZENE*; O-ETHYLTOLUENE
109 1,2,4-TRIMETHYLBENZENE	0.4	100 (2)	1000 (A)	125000	170000	PSUEDOCUMENE
110 tert.BUTYLBENZENE	0.3					*(1,1-DIMETHYLETHYL)BENZENE*
111 tert.BUTYLCYCLOHEXANE	0.4					
112 1,3-DICHLOROBENZENE	0.8					
113 1-DECENE	1.3	180000 (3)	60000 (A)			n-DECYLENE
114 (CHLOROMETHYL)BENZENE	4.3					alpha-CHLOROTOLUENE; BENZYL CHLORIDE
115 1,5-DICHLOROPENTANE	0.3					
116 isoBUTYLBENZENE	0.3					
117 DECANE	0.5					*n-DECANE*
118 sec.BUTYLBENZENE	0.2					*(1-METHYLPROPYL)BENZENE*
119 3-(CHLOROMETHYL)HEPTANE	0.3					
120 1,2,3-TRIMETHYLBENZENE	0.4			125000	175000	HEMIMELLITENE
121 1ISOPROPYL4METHYLBENZENE	0.5					*METHYL(4-METHYLETHYL)BENZENE*; 3-ISOPROPYLTOLUENE; P-CYMENE
122 1,2-DICHLOROBENZENE	0.3					o-DICHLOROBENZENE
123 INDAN	0.5					*2,3-DIHYDRO-1H-INDENE*; 2,3-DIHYDROINDENE; HYDRINDENE
124 BUTYLCYCLOHEXANE	0.4					n-BUTYLCYCLOHEXANE; 1-CYCLOHEXYLBUTANE
125 1,3-DIETHYLBENZENE	0.4					m-DIETHYLBENZENE
126 1,4-DIETHYLBENZENE	0.5					p-DIETHYLBENZENE

Table 2 ctd.

Characteristics of the Organics Measured by the Gas Chromatographic Systems of MAMU #2

All concentrations are in terms of ug/m³ (micrograms per cubic metre) Updated October 16, 1987

	Detection Limits	Standards, Guidelines or Provisional Guidelines	Criterion	TWA	STEL	Alternate Names
127 BUTYLBENZENE	0.3					n-BUTYLBENZENE
128 1,2-DIETHYLBENZENE	0.5					o-DIETHYLBENZENE
129 transDECAHYDRONAPHTHALENE	0.3					t-DECALIN; BICYCLO[4,4,0]DECANE
130 cis-DECAHYDRONAPHTHALENE	0.3					c-DECALIN; BICYCLO[4,4,0]DECANE
131 UNDECANE	0.8					*n-UNDECANE*; HENDECANE
132 1235-TETRAMETHYLBENZENE	0.6					ISODURENE
133 1234-TETRAMETHYLBENZENE	0.6					PREHNITENE
134 1,3-DIISOPROPYLBENZENE	0.8					*1,3-BIS(1-METHYLETHYL)BENZENE*
135 1234TETRAHYDRONAPHTHALENE	0.6					TETRALIN
136 1,4-DIISOPROPYLBENZENE	0.8					*1,4-BIS(1-METHYLETHYL)BENZENE*; ISOPROPYLCUMENE
137 NAPHTHALENE	0.8	36 (3)	22.5 (A)			
138 DODECANE	1.3					*n-DODECANE*

Table 2 ctd.

Characteristics of the Organics Measured by the Gas Chromatographic Systems of MAMU #2

All concentrations are in terms of ug/m^3 (micrograms per cubic metre)   Updated October 16, 1987

Detection Limits	Standards, Guidelines or Provisional Guidelines	Criterion	TWA	STEL	Alternate Names

NOTES:
(1) Standard
(2) Guideline
(3) Provisional Guideline
(4) Standard for the sum of o-, m-, & p- Xylenes

(A) Ambient Air Quality Criterion based on a 24-hour average concentration
(B) Ambient Air Quality Criterion based on a 1-hour average concentration
(please note; if the maximum 1-hour average concentration of a contaminant is LESS than the Criterion concentration based on a 24-hour average, then that Criterion has NOT been exceeded.)

TWA - Time Weighted Average for a normal 8-hour workday and a 40-hour workweek, to which nearly all workers may be repeatedly exposed without adverse effect.

STEL - Short Term Exposure Limit - concentration to which workers can be exposed for a short period of time (15 minutes) without adverse effect.

* - Denotes name approved by the International Union of Pure and Applied Chemistry (IUPAC).

Table 2 ctd.

Characteristics of the Common Contaminants as Measured Continuously by MAMU #2

All concentrations are in terms of ppm (parts per million)

	Detection Limits	Standards, Guidelines or Provisional Guidelines	Criterion	TWA	STEL		Alternate Names
1 SULPHUR DIOXIDE	0.005	0.300	0.25	2	5	SO_2	
2 TOTAL REDUCED SULPHUR	0.005	0.027 *	0.027	10	15 **	TRS	
3 NITROGEN OXIDES	0.01	0.25 ***	N/A	-	-	NO_x	OXIDES of NITROGEN
4 NITROGEN DIOXIDE	0.01	N/A	0.20	5	5	NO_2	
5 NITRIC OXIDE	0.01	N/A	N/A	25	35	NO	NITROGEN MONOXIDE
6 OZONE	0.01	0.1	0.08	0.1	0.3	O_3	
7 CARBON MONOXIDE	0.1	5.0	30.0	50	400	CO	

* As equivalent H_2S and applicable only for Kraft Pulp Mills
TRS may contain any of the following: Hydrogen Sulphide (H_2S), Methyl Mercaptan (CH_3SH), Dimethyl Sulphide (C_2H_6S) and Dimethyl Disulphide ($C_2H_6S_2$).

** The TWA and STEL for TRS is expressed solely for Hydrogen Sulphide concentrations

*** Expressed as NO_2

S = Standard; G = Guideline; P = Provisional Guideline

Table 3

Surface Analysis -- Buffalo, New York

```
--- Date: 87/10/08  00:00 ---

 ID HR CNT TY SKYAMT    VIS PREC     PRES TEM DEW WIND GU CLOUD

BUF 00 101 SA  S S O     25 ..      10074   9   6 2309
BUF 01   1 SA  S O       25 ..      10084   8   4 2710
BUF 02   1 SA  B O       10 R-      10089   8   5 2710
BUF 03   1 SA  O         15 R-      10093   8   6 2609
BUF 04   1 SA  S O       20 ..      10095   8   6 2407
BUF 05   1 SA  S O       20 ..      10095   8   6 2508
BUF 06 101 SA  O         25 ..      10095   7   6 2608
BUF 07  11 SA  S S       25 ..      10098   7   5 2609
BUF 08  11 SA  S O       15 ..      10101   6   5 2609
BUF 09  11 SA  S S O     15 RW-     10108   7   6 2708
BUF 10   1 SA  S B O     10 RW-     10119   7   6 3308
BUF 11   1 RS  S B O     15 RW-     10129   6   4 3108
BUF 12 101 SA  S O       25 RW-     10140   6   4 3310
BUF 13   1 SA  S S B B   25 ..      10155   6   4 3212
BUF 14   1 SA  S O       25 ..      10164   7   3 3014 18
BUF 15   1 SA  S B       25 ..      10172   7   3 3210
BUF 16   1 SA  S S B     25 RW-     10179   7   2 3110
BUF 17   1 SA  S B B     20 RW-     10184   6   3 3012
BUF 18 200                          10188   7   3 3111
BUF 19   1 SA  S S B     25 ..      10190   8   1 2914 19
BUF 20   1 SA  S B       25 ..      10199   8  -1 2813 20
BUF 21   1 SA  S B       25 ..      10205   9   0 2914
BUF 22   1 SA  S B       25 ..      10212   8   0 3014
BUF 23   1 SA  S O       30 ..      10219   7  -1 2912
```

In the above surface analysis weather synopsis as reported by the Buffalo weather office on the universal 2322 form. The atmospheric pressure is reported in tens of kilopascals; temperature and dew point temperatures are in degrees Celsius; and the wind is reported as XXyy where XX is the direction from which the wind is blowing (in tens of degrees true) and yy is the wind speed in knots (kts).

Table 3 ctd.

Surface Analysis -- Buffalo, New York

```
--- Date: 87/10/09  00:00 ---

  ID HR CNT TY SKYAMT      VIS PREC      PRES TEM DEW WIND GU CLOUD

BUF 00 101 SA  S O         30 ..       10230   7  -1 3010
BUF 01   1 SA  S B         30 ..       10240   6  -1 2909
BUF 02   1 SA  B           30 ..       10244   6   0 2909
BUF 03   1 SA  O           30 ..       10251   6  -1 3008
BUF 04   1 SA  B           30 ..       10251   5  -2 2908
BUF 05   1 SA  B           30 ..       10254   4  -2 3010
BUF 06 101 SA  B           30 ..       10254   4  -3 2605
BUF 07   1 SA  B           30 ..       10257   4  -3 1904
BUF 08   1 SA  O           30 ..       10254   4  -2 1405
BUF 09   1 SA  B           30 ..       10254   4   0 1606
BUF 10   1 SA  B O         30 ..       10261   5   2 1808
BUF 11   1 SA  S S B       25 ..       10257   6   1 1806
BUF 12 102 SA  B           25 ..       10257   6   1 1908
BUF 13   1 SA  S B         30 ..       10251   7   0 2112
BUF 14   1 SA  O           30 ..       10251   7   0 2012 17
BUF 15   1 SA  O           30 ..       10247   9   1 1914 20
BUF 16   1 SA  O           25 ..       10243  11   1 2017 22
BUF 17   1 SA  S O         25 ..       10233  11   1 2017 23
BUF 18 101 SA  S O         20 RW-      10222  11   2 2114 21
BUF 19   1 SA  S O         20 ..       10215  11   2 2215 22
BUF 20   1 SA  S S B O     20 ..       10201  12   2 2117 25
BUF 21   1 SA -S           25 ..       10194  13   1 2218 26
BUF 22   1 SA -S           25 ..       10190  13   0 2118 27
BUF 23   1 SA -S           25 ..       10201  12   1 2212
```

Table 3 ctd.

Surface Analysis -- Buffalo, New York

```
--- Date: 87/10/10  00:00 ---

 ID HR CNT TY SKYAMT     VIS PREC      PRES TEM DEW WIND GU CLOUD

BUF 00 101 SA -S          25 ..       10215  12   2 2313
BUF 01   1 SA   S B B     25 ..       10224  12   2 2212
BUF 02   1 SA   S S-O     25 ..       10228  12   3 2212
BUF 03   1 SA   S S-B     25 ..       10228  11   3 2110
BUF 04   1 SA   S S O     25 ..       10230  12   3 2311
BUF 05   1 SA   S S O     20 ..       10234  13   7 2809
BUF 06 101 SA   S O       20 ..       10241  12   6 3012
BUF 07   1 SA   S O       20 ..       10249  10   5 3207
BUF 08   1 SA   B O       25 ..       10255   9   4 3104
BUF 09   1 SA   S O       30 ..       10260   9   3 2706
BUF 10   1 SA   S O       30 ..       10267   9   3 3008
BUF 11   1 SA   S O       30 ..       10271   8   4 3207
BUF 12   1 SA   S B O     30 ..       10275   8   4 3104
BUF 13   1 SA   S B O     30 ..       10282   8   4 3008
BUF 14   1 SA   S B O     35 ..       10296   9   4 3010
BUF 15  11 SA   S B O     35 ..       10299   9   3 3109
BUF 16   1 SA   S S B     40 ..       10303   9   3 3308
BUF 17   1 SA   S S       40 ..       10305  10   3 3009
BUF 18 101 SA   B B       40 ..       10303   9   3 3412
BUF 19   1 SA   S O       40 ..       10296   8   3 3508
BUF 20   1 SA   S O       35 ..       10300   8   3 3508
BUF 21   1 SA   S O       35 ..       10304   8   2 3306
BUF 22   1 SA   B O       35 ..       10300   7   1 3605
BUF 23   1 SA   S B O     30 ..       10300   7   1 0205
```

Table 3 ctd.

Surface Analysis -- Buffalo, New York

```
--- Date: 87/10/12  00:00 ---

 ID HR CNT TY SKYAMT     VIS PREC       PRES TEM DEW WIND GU CLOUD

BUF 00   1 SA  S O        25 ..        10255   6   3 0803
BUF 01   1 SA  S O        25 ..        10255   6   3 0903
BUF 02   1 SA  O          25 ..        10252   6   2 1606
BUF 03   1 SA  O          20 ..        10252   6   3 1805
BUF 04   1 SA  O          20 ..        10247   6   3 1604
BUF 05   1 SA  S O        20 ..        10244   5   3 1806
BUF 06 101 SA  S O        20 ..        10240   5   3 1605
BUF 07   1 SA  S O        25 ..        10233   5   3 1605
BUF 08   1 SA  S O        25 ..        10230   5   3 1604
BUF 09   1 SA  O          20 ..        10223   4   3 1005
BUF 10   1 SA  O          20 ..        10223   4   3 1706
BUF 11   1 SA  O          25 ..        10219   4   3 1705
BUF 12 101 SA  O          20 ..        10219   5   3 2007
BUF 13   1 CO  O          20 ..        10219   5   3 1705
BUF 14   1 SA  O          25 ..        10219   6   3 2004
BUF 15   1 SA  S S        30 ..        10212   8   3 2407
BUF 16   1 SA  S S B      30 ..        10205  11  -1 2703
BUF 17   1 SA  S S B B    30 ..        10205  11  -2 2807
BUF 18   1 SA  S B O      30 ..        10198  10  -1 2309
BUF 19   1 CO  S O        30 ..        10195   9  -1 2906
BUF 20   1 SA  S B O      30 ..        10191   9   0 2509
BUF 21   1 SA  S B O      25 ..        10191   8   1 2209
BUF 22   1 SA  S B B      25 ..        10191   8   1 1907
BUF 23   1 SA  S S O      25 ..        10195   7   1 2107
```

Table 4

Itinerary at the Occidental Chemical Corporation liquid hazardous waste incineration facility
Niagara Falls, New York

Thursday, October 8:	
10:15 - 12:00	Pretest of incinerator
16:00	NAPL waste feed introduced
16:35	In-stack testing started
21:00	Test completed & NAPL waste feed halted
Friday, October 9:	
10:30	NAPL waste feed introduced
10:50	In-stack testing started
15:55	Testing completed
16:00	NAPL waste feed halted
Saturday, October 10:	
10:05	NAPL waste feed introduced
10:25	In-stack testing started
15:10	Testing completed
15:20	NAPL waste feed halted
Monday, October 12:	
09:30	NAPL waste feed introduced
11:55	In-stack testing started
16:07	Testing completed
16:10	NAPL waste feed stopped

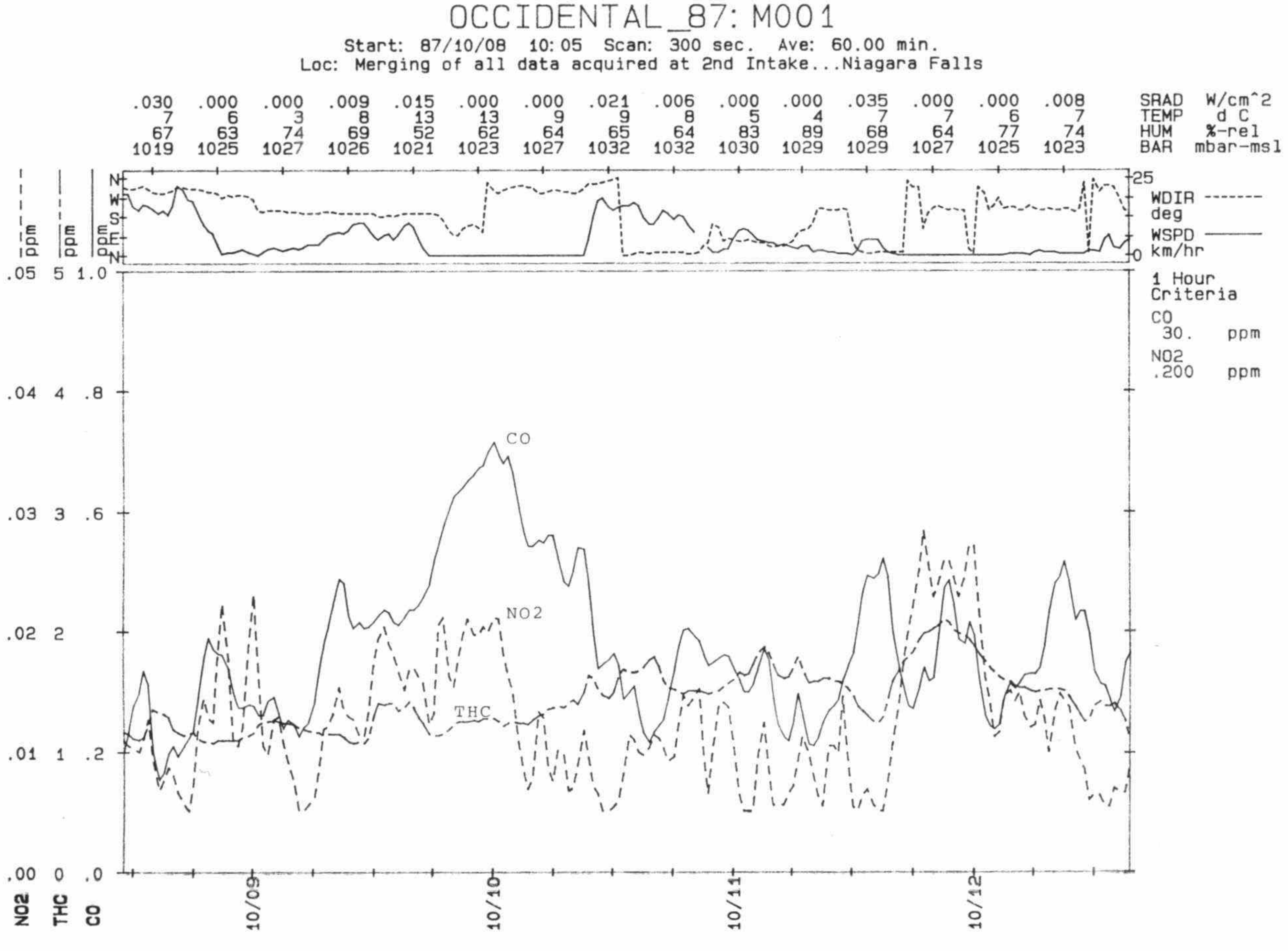

Figure 2
Concentration/Time

Table 5

Occidental 1987 Air Quality Survey - VOC Analytical Results

Sample Identification	B8OCT_1	B8OCT_2	B8OCT_3	B8OCT_4	B9OCT_1	B12OCT_1			
Sample Start Time	10:11	12:58	16:23	18:22	11:28	11:20			
Duration	One-Hour	One-Hour	One-Hour	One-Hour	One-Hour	One-Hour			
Analysis Start Time	11:19	14:06	17:31	19:30	12:36	12:28			
Sampling Date	OCT 8	OCT 8	OCT 8	OCT 8	OCT 9	OCT 12			
							COUNT	AVERAGE	MAXIMUM
1 PROPANE	3.3	1.7	1.6	1.5	4.0	2.9	6	2.5	4.0
2 PROPADIENE									
3 PROPYNE									
4 CYCLOPROPANE									
5 2-METHYLPROPANE	9.8	1.6	1.7	0.8	1.5	1.6	6	2.8	9.8
6 CHLOROETHENE									
7 1-BUTENE									
8 1,3-BUTADIENE									
9 BUTANE	3.1	2.7	2.0	2.2	4.4	4.2	6	3.1	4.4
10 1-BUTYNE									
11 CHLOROETHANE									
12 3-METHYL-1-BUTENE									
13 2-METHYLBUTANE	2.5	2.3	1.6	1.9	3.0	2.9	6	2.4	3.0
14 2-METHYL-1-BUTENE									
15 PENTANE	1.9	1.7	1.2	1.4	2.3	2.1	6	1.8	2.3
16 2-METHYL-1,3-BUTADIENE									
17 trans-2-PENTENE									
18 cis-2-PENTENE									
19 DICHLOROMETHANE									
20 2-METHYL-2-BUTENE									
21 2,2-DIMETHYLBUTANE									
22 trans-1,2-DICHLOROETHENE									
23 3-METHYL-1-PENTENE									

Table 5 ctd.

Occidental 1987 Air Quality Survey - VOC Analytical Results

Sample Identification	B8OCT_1	B8OCT_2	B8OCT_3	B8OCT_4	B9OCT_1	B12OCT_1	COUNT	AVERAGE	MAXIMUM
Sample Start Time	10:11	12:58	16:23	18:22	11:28	11:20			
Duration	One-Hour	One-Hour	One-Hour	One-Hour	One-Hour	One-Hour			
Analysis Start Time	11:19	14:06	17:31	19:30	12:36	12:28			
Sampling Date	OCT 8	OCT 8	OCT 8	OCT 8	OCT 9	OCT 12			
24 4-METHYL-1-PENTENE									
25 CYCLOPENTANE									
26 2,3-DIMETHYLBUTANE									
27 2-METHYLPENTANE	1.3	1.1	0.8	0.9	1.4	1.3	6	1.1	1.4
28 3-METHYLPENTANE									
29 1-HEXENE									
30 cis-1,2-DICHLOROETHENE									
31 2-CHLOROBUTANE									
32 HEXANE	1.2	1.0	0.8	0.9	1.3	1.3	6	1.1	1.3
33 1-CHLORO-2-METHYLPROPANE									
34 TRICHLOROMETHANE									
35 trans-3-HEXENE									
36 3-CHLORO-2-METHYLPROPENE									
37 METHYLCYCLOPENTANE									
38 2,2-DIMETHYLPENTANE									
39 1,2-DICHLOROETHANE									
40 2,4-DIMETHYLPENTANE									
41 1,1,1-TRICHLOROETHANE									
42 2,2,3-TRIMETHYLBUTANE									
43 1-CHLOROBUTANE									
44 BENZENE	3.2	3.0	3.3	3.5	2.9	3.2	6	3.2	3.5
45 TETRACHLOROMETHANE									
46 3,3-DIMETHYLPENTANE									
47 CYCLOHEXANE									

Table 5 ctd.

Occidental 1987 Air Quality Survey - VOC Analytical Results

Sample Identification	B8OCT_1	B8OCT_2	B8OCT_3	B8OCT_4	B9OCT_1	B12OCT_1			
Sample Start Time	10:11	12:58	16:23	18:22	11:28	11:20			
Duration	One-Hour	One-Hour	One-Hour	One-Hour	One-Hour	One-Hour			
Analysis Start Time	11:19	14:06	17:31	19:30	12:36	12:28			
Sampling Date	OCT 8	OCT 8	OCT 8	OCT 8	OCT 9	OCT 12			
							COUNT	AVERAGE	MAXIMUM
48 2,3-DIMETHYLPENTANE									
49 2-METHYLHEXANE									
50 CYCLOHEXENE									
51 DIBROMOMETHANE									
52 1,2-DICHLOROPROPANE									
53 3-METHYLHEXANE									
54 2,3-DICHLOROPROPENE									
55 TRICHLOROETHENE									
56 2,2,4-TRIMETHYLPENTANE									
57 1-HEPTENE									
58 HEPTANE									
59 trans-2-HEPTENE									
60 METHYLCYCLOHEXANE									
61 2,2-DIMETHYLHEXANE									
62 ETHYLCYCLOPENTANE									
63 4-METHYLCYCLOHEXENE									
64 2,5-DIMETHYLHEXANE									
65 1-CHLOROPENTANE									
66 1,1,2-TRICHLOROETHANE									
67 2,3,4-TRIMETHYLPENTANE									
68 TOLUENE	3.2	2.9	2.4	3.6	2.4	2.4	6	2.8	3.6
69 1,3-DICHLOROPROPANE									
70 2-METHYLHEPTANE									
71 4-METHYLHEPTANE									

Table 5 ctd.

Occidental 1987 Air Quality Survey - VOC Analytical Results

Sample Identification	B8OCT_1	B8OCT_2	B8OCT_3	B8OCT_4	B9OCT_1	B12OCT_1			
Sample Start Time	10:11	12:58	16:23	18:22	11:28	11:20			
Duration	One-Hour	One-Hour	One-Hour	One-Hour	One-Hour	One-Hour			
Analysis Start Time	11:19	14:06	17:31	19:30	12:36	12:28			
Sampling Date	OCT 8	OCT 8	OCT 8	OCT 8	OCT 9	OCT 12			
							COUNT	AVERAGE	MAXIMUM
72 c-1,3-DIMETHYLCYCLOHEXANE									
73 3-METHYLHEPTANE									
74 1,2-DIBROMOETHANE									
75 1,1-DIMETHYLCYCLOHEXANE									
76 1-OCTENE									
77 trans12DIMETHYLCYCLOHEXAN									
78 trans-4-OCTENE									
79 TETRACHLOROETHENE									
80 c-1,4-DIMETHYLCYCLOHEXANE									
81 OCTANE									
82 trans-2-OCTENE									
83 cis12DIMETHYLCYCLOHEXANE									
84 CHLOROBENZENE									
85 ETHYLCYCLOHEXANE									
86 1-CHLOROHEXANE									
87 ETHYLBENZENE	0.7	0.6	0.4	0.5	0.5	0.4	6	0.5	0.7
88 M,P-XYLENE	2.3	2.0	1.3	1.5	1.3	0.9	6	1.5	2.3
89 4-METHYLOCTANE									
90 2-METHYLOCTANE									
91 3-METHYLOCTANE									
92 STYRENE									
93 1,4-DICHLOROBUTANE									
94 o-XYLENE	0.8	0.7	0.5	0.6	0.5	0.3	6	0.5	0.8
95 1,1,2,2-TETRACHLOROETHANE									

Table 5 ctd.

Occidental 1987 Air Quality Survey - VOC Analytical Results

	Sample Identification	B8OCT_1	B8OCT_2	B8OCT_3	B8OCT_4	B9OCT_1	B12OCT_1			
	Sample Start Time	10:11	12:58	16:23	18:22	11:28	11:20			
	Duration	One-Hour	One-Hour	One-Hour	One-Hour	One-Hour	One-Hour			
	Analysis Start Time	11:19	14:06	17:31	19:30	12:36	12:28			
	Sampling Date	OCT 8	OCT 8	OCT 8	OCT 8	OCT 9	OCT 12			
								COUNT	AVERAGE	MAXIMUM
96	1,2,3-TRICHLOROPROPANE									
97	1-NONENE									
98	trans-1,4-DICL-2-BUTENE									
99	NONANE									
100	ISOPROPYLBENZENE									
101	2-CHLOROTOLUENE									
102	3-CHLOROTOLUENE									
103	4-CHLOROTOLUENE									
104	PROPYLBENZENE									
105	3-ETHYLTOLUENE	0.6	0.6	0.4	0.5			4	0.5	0.6
106	4-ETHYLTOLUENE									
107	1,3,5-TRIMETHYLBENZENE									
108	2-ETHYLTOLUENE									
109	tert.BUTYLBENZENE									
110	1,2,4-TRIMETHYLBENZENE	0.9	0.8	0.5	0.6	0.4		5	0.7	0.9
111	tert.BUTYLCYCLOHEXANE									
112	1,3-DICHLOROBENZENE									
113	(CHLOROMETHYL)BENZENE									
114	1-DECENE									
115	1,5-DICHLOROPENTANE									
116	isoBUTYLBENZENE									
117	sec.BUTYLBENZENE									
118	DECANE									
119	3-(CHLOROMETHYL)HEPTANE									

Table 5 ctd.

Occidental 1987 Air Quality Survey - VOC Analytical Results

Sample Identification	B8OCT_1	B8OCT_2	B8OCT_3	B8OCT_4	B9OCT_1	B12OCT_1			
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Duration	One-Hour	One-Hour	One-Hour	One-Hour	One-Hour	One-Hour			
Analysis Start Time	11:19	14:06	17:31	19:30	12:36	12:28			
Sampling Date	OCT 8	OCT 8	OCT 8	OCT 8	OCT 9	OCT 12			
							COUNT	AVERAGE	MAXIMUM
120 1,2,3-TRIMETHYLBENZENE									
121 1ISOPROPYL4METHYLBENZENE									
122 1,2-DICHLOROBENZENE									
123 INDAN									
124 BUTYLCYCLOHEXANE									
125 1,3-DIETHYLBENZENE									
126 1,4-DIETHYLBENZENE									
127 BUTYLBENZENE									
128 1,2-DIETHYLBENZENE									
129 transDECAHYDRONAPHTHALENE									
130 cis-DECAHYDRONAPHTHALENE									
131 UNDECANE									
132 1235-TETRAMETHYLBENZENE									
133 1234-TETRAMETHYLBENZENE									
134 1,3-DIISOPROPYLBENZENE									
135 1234TETRAHYDRONAPHTHALENE									
136 1,4-DIISOPROPYLBENZENE									
137 NAPHTHALENE									
138 DODECANE	0.7	0.3			0.7	0.8	4	0.6	0.8

Table 5 ctd.

Occidental 1987 Air Quality Survey - VOC Analytical Results

Sample Identification	B8OCT_1	B8OCT_2	B8OCT_3	B8OCT_4	B9OCT_1	B12OCT_1			
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Duration	One-Hour	One-Hour	One-Hour	One-Hour	One-Hour	One-Hour			
Analysis Start Time	11:19	14:06	17:31	19:30	12:36	12:28			
Sampling Date	OCT 8	OCT 8	OCT 8	OCT 8	OCT 9	OCT 12			
							COUNT	AVERAGE	MAXIMUM
Number of Organics Identified	15	15	14	14	14	13		14	15
Total # of Peaks on Chromatogram	34	30	26	26	28	24		28	34
Total Area of Peaks	3505	2003	1640	1761	2184	1938		2172	3505
Area of Identified Peaks	2469	1543	1183	1352	1742	1560		1641	2469
Area % Identified Peaks	70	77	72	77	80	81		76	81
Total Organic Concentrations (ug/m3)	35.4	23.0	18.3	20.4	26.4	24.1		24.6	35.4
Alkanes (ug/m3)	23.7	12.3	9.7	9.5	18.5	17.0		15.1	23.7
Cycloalkanes (ug/m3)	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0
Alkenes (ug/m3)	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0
Cycloalkenes (ug/m3)	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0
Alkynes (ug/m3)	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0
Aromatics (ug/m3)	11.6	10.7	8.7	10.9	7.9	7.1		9.5	11.6
Chlorinated Alkanes (ug/m3)	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0
Chlorinated Alkenes (ug/m3)	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0
Chlorinated Aromatics (ug/m3)	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0
Benzene:Ethylbenzene	4.3	4.7	8.0	7.2	6.4	9.0		6.6	9.0
Toulene:Etylbenzene	4.4	4.6	5.9	7.4	5.4	6.9		5.8	7.4
Xylene:Ethylbenzene	4.2	4.2	4.2	4.2	3.8	3.3		4.0	4.2

Table 6

Common Contaminants

Maximum One-Hour Average Ground Level Concentrations

DATE	START TIME	END TIME	CO (ppm)	THC (ppm)	NO2 (ppm)	O3 (ppm)	W.S. (km/hr)	W.D. (deg.)
Oct. 8	10:05	12:05	0.3	1.2	0.01	0.014	18	310
Oct. 8	16:35	21:05	0.4	1.2	0.02	0.023	10	295
Oct. 9	10:35	16:05	0.4	1.4	0.02	0.020	8	190
Oct. 10	10:05	15:05	0.4	1.7	0.02	0.019	16	360
Oct. 12	09:35	15:35	0.4	1.4	ND	0.031	3	270

PCB Results

Date	Times		Comments	Concentrations
Oct. 8	16:45	21:00	8 half-hour Samples 2 Calibrations	ND DL = 35 ng/m³
Oct. 9	10:30	16:00	4 half-hour Samples 1 Calibration	ND DL = 29 ng/m³
Oct. 10	10:00	15:00	3 half-hour Samples 2 Calibrations	ND DL = 38 ng/m³
Oct. 12	9:30	16:10	4 half-hour Samples 2 Calibrations	ND DL = 36 ng/m³

ng/m³ - nanograms per cubic metre;
DL - Detection Limit
ppm - Parts Per Million;
W.S. - Wind Speed;
ND - Not Detected
km/hr - Kilometres per Hour
W.D. - Wind Direction (From)

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